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42
United States Department of Agriculture,
BUREAU OF CHEMISTRY,

H. W. WILEY, Chief of Bureau.

YEAST CULTURES FOR EXPERIMENTAL PURPOSES.

The Bureau of Chemistry has for several years conducted preliminary investigations on the use of pure yeast cultures in the fermenting of fruit juices and has already published Bulletins 71, 88, and 111, relating to this subject.¹ Samples of yeast have also been furnished from the Enological Laboratory to those who desired to experiment with them. The results both of the experiments made by the Bureau and by private individuals have been promising, and one or more cultures will now be furnished to individuals or firms who wish to experiment with them, together with simple instructions for their use, provided that the applicant will agree to report the results so obtained. A technical report is not demanded, but a definite statement of the character of the material fermented and the result so obtained, as compared with the results of the procedure commonly followed, should be given.

The following list of yeasts selected from the collection now in the laboratory are of known value and are offered to any who wish to experiment with such cultures:

Nos. 8, 37, 66, and 73, for apple cider.

Nos. 46, 59, 161, and 162, for red grape juices.

Nos. 47, 61, and 165, for sparkling fermented beverages.

Nos. 53 and 73, for white grape juices.

In making application for yeasts designate them by number and state the use for which they are intended, so that suggestions may be made and substitutions offered if the stock of any yeast happens to be exhausted. Applications should reach the laboratory two weeks before the yeast is needed, and should be addressed to—WM. B. ALWOOD, In Charge, ENOLOGICAL INVESTIGATIONS, CHARLOTTESVILLE, VA.

H. W. WILEY,
Chief, Bureau of Chemistry.

WASHINGTON, D. C., *August 15, 1908.*

¹ U. S. Dept. Agr., Bureau of Chemistry, Bulletin 71. A Study of Cider Making in France, Germany, and England, with Comments and Comparisons on American work. By Wm. B. Alwood, Special Agent. 1903. Price 20 cents. Bulletin 88. The Chemical Composition of Apples and Cider. 1. The composition of apples in relation to cider and vinegar production. 2. The composition of cider as determined by dominant fermentation with pure yeasts. By Wm. B. Alwood, R. J. Davidson, and Wm. A. P. Moncure, Virginia Agricultural Experiment Station. 1904. Price 5 cents. Bulletin 111. The Fermenting Power of Pure Yeasts and Some Associated Fungi. 1908. By Wm. B. Alwood. Price 5 cents. These may be obtained from the Superintendent of Documents, Washington, D. C., for the prices given.

DIRECTIONS FOR THE USE OF PURE YEAST CULTURES.

The vials sent out by the Bureau of Chemistry contain a strong culture of pure yeast, and should be handled as follows: Before uncorking the vial, cool it carefully with ice to avoid loss of yeast by effervescence when the cork is removed. The yeast in an 8-ounce vial is sufficient to inoculate one cask of 50-gallons of must and a 16-ounce vial is sufficient for 100 gallons of must, if used within fifteen days from the date given on the label; but when a larger amount of starter is desired, the following procedure is advised:

Prepare from 2 to 10 gallons of fresh apple or grape juice by first bringing the same to the boiling point; then pour it into a clean wooden vessel and at once cover with a cloth wrung from boiling water. Ten-gallon casks are very serviceable for this work. Only about 8 gallons of must should be used in a cask, so that there will be no danger of foaming over, and the bung should be closed only moderately tight with a clean plug of cotton. This permits the escape of gas and prevents the entrance of germs.

The cask should be new and most carefully cleaned with live steam or boiling water; then the hot must should be poured into it, the bung closed, and the contents left to cool. Stand whatever container is used in a warm place where the temperature will not be lower than 75° F., and when the temperature of the heated juice has fallen to about 85° or 90° F., empty the contents of a vial of yeast into it and let it stand covered for two or three days, at the end of which time it should be in strong fermentation. It is then ready for use. One pint of this new culture is sufficient to inoculate 50 gallons of must. Stir well before using. From this culture other vessels of heated must may be sown so as to keep cultures on hand for some weeks.

The juice or must intended for the experiment should be freshly pressed, placed in a perfectly clean barrel or cask, and the yeast culture poured into it at once. Do not fill the cask quite full of must, but leave from 4 to 5 inches of space beneath the bung, so that there shall be no overflow of foam. Close the bung with a fermentation funnel or with clean cotton and keep it closed, but be careful to prevent the cotton from becoming moist, as this will greatly favor the entrance of malferments, especially the acetic ferments. A properly made cotton plug if kept dry strains the germs out of any air which may enter the cask, and readily permits the escape of gas, but it is not so safe as the fermentation funnels described in Bulletin 71, which should be consulted. In the case of fermented red grape juice, the yeast culture must be poured into the pulped grapes as crushed, and it is better to use twice or three times the quantity recommended for the expressed must.

The first or tumultuous fermentation will be completed in from three to ten days, according to the temperature of the room; 75° to 80° F. is a favorable temperature. At the subsidence of this first fermentation draw the liquor, separating it as perfectly as possible from the dregs, and place it in a clean cask for the second fermentation. This cask should stand in a room where the temperature will be fairly constant at

55° to 60° F., and should be closed with some form of fermentation funnel so as to permit the escape of gas and prevent the entrance of all undesirable organisms.

The time required for the second fermentation will depend on whether apple or grape must is being fermented and also on the richness of the juice. For ordinary apple cider, if the procedure outlined is followed, the second fermentation should be completed in the course of eight or ten weeks, or at most three months, and the liquor should then be bottled if dry sparkling cider is desired. Cider made from must which shows a specific gravity before fermentation of 1.050 or higher can be fermented to 1.003 or 1.002 and will still develop sufficient gas in the bottle for a bright effervescing cider.

The subject of the secondary fermentation of fruit juices can not be discussed in this brief circular. The successful use of the pure cultures depends wholly upon mixing them promptly with the expressed must or pulped fruit. Moreover, it is useless to add pure yeast cultures to poor thin musts or to musts derived from partly decayed and unclean fruit.

WM. B. ALWOOD.

In Charge, Enological Investigations.

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